DETAILED ACTION

Claim Objections

1. Claim 7 is objected to because of the following informalities: the claim recites "first mask hole)" in line 6 of the claim. The ")" should be removed because there is no corresponding open parenthesis. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 6-7 and 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shtein et al. (U.S. Publication No. 2003/0087471) in view of Tanaka (U.S. Publication No. 2001/0026835), Koike et al. (JP 57-060640), Himeshima et al. (U.S. Publication No. 2001/0004469), and Den Engelsen et al. (U.S. Publication No. 2002/0036455).

Shtein discloses a method of making an organic light emitting device [0003], comprising of a first electrode and a second electrode sandwiching an organic layer, which can be formed in a vapor deposition method using a mask [0134]. The mask can be substantially funnel-shaped with an inner wall angle of 45° ([0107]; [0113]; Fig. 15).

Shtein does not explicitly teach that a transparent substrate, a plurality of first electrodes, an active element driving one of the first electrodes, an insulating layer formed on the first electrodes, an organic layer comprising of a hole transfer layer, a hole injection layer, an organic light emitting layer, an electron injection layer, and a common second electrode layer. However, Shtein does teach that the device being made is an organic light emitting device. Accordingly, Tanaka teaches a method of making an organic light emitting device, such as an electroluminescent (EL) device [0160]. The EL device comprises of a plurality of first electrodes 27, an EL layer 29 formed over the first electrodes, and a common electrode formed over the EL layer, wherein one of the first electrodes is driven by a TFT 23 and an insulating

layer 28 is formed over the first electrodes (Fig. 19B). The EL layer can comprise of a hole injection layer, a hole transport layer, a light emitting layer, an electron transport layer, and an electron injection layer [0168]. The EL layers can be formed by vapor deposition [0169] over a glass (i.e., transparent) substrate [0091]. Because Tanaka teaches that such structures for an organic light emitting device were operable in the art, it would have been obvious to one of ordinary skill in the art at the time of invention to have made the light emitting device of Shtein having the device structure as taught by Tanaka with a reasonable expectation of success. Additionally, it would have been obvious to one of ordinary skill in the art at the time of invention to have formed one of the hole transfer layer, hole injection layer, light emitting layer, electron injection layer, and electron transfer layer using the mask of Shtein with a reasonable expectation of success because Shtein teaches that the organic layer is vapor depositing using a mask.

Shtein does not explicitly teach that the mask is a multilayer metal mask formed of a process comprising of a first process, a second process, a third process, and a fourth process as claimed. However, Koike teaches a method for making a cheap shadow mask having very accurate holes. The method comprises of forming photosensitive layers 9 and 9' on a thick iron plate 1, and then exposing and developing the photosensitive layers. A metal film is then electrodeposited onto side A, which have holes (i.e., first mask holes as claimed) with the smaller area. The metal thin film can be an electroplated nickel film (see partial translation). The thick plate is etched on side B to form second mask holes. The photosensitive layers 9 and 9' are then removed (abstract; Figs. 1-3 and 7). Because Shtein teaches the need for accurate deposition [0097],[0106], it would have been obvious to one of ordinary skill in the art at the time of invention to have formed the mask of Shtein using the method of Koike with a reasonable expectation of success. One would have been motivated to do so in order to have formed accurate holes on the mask for more accurate deposition.

Shtein, Tanaka, and Koike do not explicitly teach that the mask is in close contact with the insulating layer on the substrate. However, Himeshima teaches that it was well known to place a shadow mask in close contact with an insulating layer on the substrate in the art of vapor depositing a layer onto an EL substrate (abstract; Fig. 7). Because Himeshima teaches that such a process was operable in the EL art, it would have been obvious to one of ordinary skill in the

art at the time of invention to have placed the mask of Koike in close contact with the substrate of Shtein when vapor depositing an organic layer with a reasonable expectation of success.

Koike does not explicitly teach that the thick plate is formed of a nickel-iron alloy. Koike only teaches that the thick plate is made of iron (abstract). However, Den Engelsen teaches that a mask made of a nickel-iron alloy has a much lower expansion coefficient than iron masks [0035]. A lower expansion coefficient of the mask prevents the mask from expanding as much during high temperatures and, thus, would maintain a more accurate hole size during a vapor deposition process. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used a nickel-iron alloy, as opposed to iron by itself, as the particular material for the thick plate of Koike with a reasonable expectation of success. One would have been motivated to do so in order to have provided for a more accurate deposition.

Claim 7: The holes formed in the electrodeposited layer should correspond to the sizes of the EL display pixels. Shtein teaches that the second mask holes should face the supply source (Fig. 15).

Claims 9-10: Den Engelsen does not explicitly teach that the nickel-iron alloy is a 42% nickel-iron alloy. However, Den Engelsen reasonably suggests that the addition of nickel in an iron layer would lower the expansion coefficient, but is silent as to how much nickel should be incorporated. One of ordinary skill in the art would have had to vary the ratio of nickel and iron through routine experimentation to have found the optimal expansion coefficient. A particular parameter can be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, and the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation (see MPEP 2144.05.II.B.). It would have been obvious to one of ordinary skill in the art at the time of invention to have optimized the nickel and iron content of the alloy through routine experimentation with a reasonable expectation of success in order to have determined the optimal expansion coefficient for the EL vapor deposition process.

4. Claims 8 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shtein '471 in view of Tanaka '835, Koike '640, Himeshima '469, and Den Engelsen '455, as applied to claim 6 above, and further in view of Chernobrod et al. (U.S. Publication No. 2002/0177007).

Koike does not explicitly teach that a curvature radius of each corner portion of the first mask holes is not larger than 5 micrometers. However, Chernobrod teaches that it was well known to have formed pixels less than half a micron in the EL art (abstract). The size of the holes in the mask of Koike must be of a similar size to that of the pixel in order to vapor deposit the organic layer in the desired areas and not in the undesired ones. Because Chernobrod teaches that such pixel sizes were operable in the EL art, it would have been obvious to one of ordinary skill in the art at the time of invention to have made the pixel sizes of Shtein less than half a micron in size and to have correspondingly made the first mask hole of Koike a similar size with a reasonable expectation of success.

Response to Arguments

5. Applicant's arguments, see pg. 5-6, filed 2/29/2008, with respect to the rejection(s) of claim(s) 1-5 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Shtein '471 in view of Tanaka '835, Koike '640, Himeshima '469, and Den Engelsen '455.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jimmy Lin whose telephone number is (571)272-8902. The examiner can normally be reached on Monday thru Friday 8AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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